National Institute of Environmental Health Sciences

Optimal temperature for malaria transmission is dramatically lower than previously predicted

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Abstract:

The ecology of mosquito vectors and malaria parasites affect the incidence, seasonal transmission and geographical range of malaria. Most malaria models to date assume constant or linear responses of mosquito and parasite life-history traits to temperature, predicting optimal transmission at 31 degrees C. These models are at odds with field observations of transmission dating back nearly a century. We build a model with more realistic ecological assumptions about the thermal physiology of insects. Our model, which includes empirically derived nonlinear thermal responses, predicts optimal malaria transmission at 25 degrees C (6 degrees C lower than previous models). Moreover, the model predicts that transmission decreases dramatically at temperatures > 28 degrees C, altering predictions about how climate change will affect malaria. A large data set on malaria transmission risk in Africa validates both the 25 degrees C optimum and the decline above 28 degrees C. Using these more accurate nonlinear thermal-response models will aid in understanding the effects of current and future temperature regimes on disease transmission.

Source: http://dx.doi.org/10.1111/ele.12015

Resource Description

Exposure :

weather or climate related pathway by which climate change affects health

Ecosystem Changes, Temperature

Geographic Feature:

resource focuses on specific type of geography

None or Unspecified

Geographic Location:

resource focuses on specific location

Non-United States

Non-United States: Africa

Health Impact: ☑

specification of health effect or disease related to climate change exposure

Infectious Disease

Infectious Disease: Vectorborne Disease

Vectorborne Disease: Mosquito-borne Disease

Mosquito-borne Disease: Malaria

Mitigation/Adaptation: ☑

mitigation or adaptation strategy is a focus of resource

Adaptation

Model/Methodology: ☑

type of model used or methodology development is a focus of resource

Outcome Change Prediction

Population of Concern: A focus of content

Population of Concern: ☑

populations at particular risk or vulnerability to climate change impacts

Low Socioeconomic Status

Resource Type: ☑

format or standard characteristic of resource

Research Article

Timescale: ☑

time period studied

Time Scale Unspecified

Vulnerability/Impact Assessment: ☑

resource focus on process of identifying, quantifying, and prioritizing vulnerabilities in a system

A focus of content